REMARKS

Discussion of Amendments

The specification has been amended to update the status of the parent ('468) application which has since issued as a U.S. patent. Claim 25 has been amended to delete the non-elected uses. Claim 25 also has been amended to replace the word "product" with -- mixture-- in the last line of the claim. No new matter has been added.

The Office Action

The Office Action sets forth the following grounds for rejection:

1. The disclosure is objected to for an alleged informality;

2. Claims 25 and 26 are rejected under 35 USC § 112, second paragraph, as allegedly indefinite; and

3. Claims 25 and 26 are rejected under 35 USC § 103(a), as allegedly unpatentable over Cintas (*J. Inclusion Phenomena & Molecular Recognition in Chemistry, 17*: 205-220, 1994) in view of Starkey et al. (USP 5,814,233), DE 19603377, Nickerson (USP 2,725,308), Mathew (USP 3,767,669), and JP 11217557.

1. Discussion of Objection to Disclosure

Applicants have amended page 1 of the specification to update the status of the parent '468 application. In view of the foregoing, the objection should be withdrawn.

2. Indefiniteness Rejection

Applicants have deleted the unrelated uses of cucurbituril derivatives including all of the non-elected uses. Applicants have also amended claim 25 to recite a reaction mixture in part b1). In view of the foregoing the indefiniteness rejection should be withdrawn.

3. *Obviousness Rejection*

Claims 25 and 26 are rejected as allegedly unpatentable over Cintas in view of Starkey et al., DE '377, Nickerson, Mathew, and JP '557. Applicants respectfully traverse the rejection.

The determination of obviousness is a legal conclusion based on factual evidence, whose analysis is mandated by *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966). Thus, the analysis should look into: (1) the scope and content of the prior art, (2) the differences between the prior art and the claimed subject mater and (3) the level of ordinary skill in the art at the time the invention was created. See, e.g., *Apple Computer, Inc. v. ArticulateSystems, Inc.*, 234 F.3d 14, 57 USPQ2d 1057 (Fed. Cir. 2000). The analysis should also consider any objective evidence of non-obviousness. See, e.g., *WeatherChem Corp. v. J.L. Clark, Inc.*, 163 F.3d 1326, 49 USPQ2d 1001 (Fed. Cir. 1998). Applicants respectfully submit that the scope and content of the prior art here are so distinctly different that the cited art cannot suggest to those of ordinary skill in the art the presently claimed invention.

DE '377 was also cited in the parent application (US 10/092,468), where DE '377 was referred to as "Buschmann et al." Applicants distinguished the claimed invention of the parent '468 application by submitting a Declaration by Kimoon Kim. The distinction made in the parent application should be applicable to the present application also; present claim 25 recites the same process limitations recited in the parent application claims, particularly claim 6. Accordingly, a copy of the Declaration submitted in the parent application is being submitted in the present application along with a copy of the partial English language translation of DE '377 which was also submitted in the parent application.

The presently claimed invention is distinct from DE '377 (Buschmann et al.) in a number of ways. First, the cucurbituril according to the presently claimed invention is prepared at a reaction temperature that differs from the 2-step process of the claimed invention. In contrast, the cyclic oligomer of Buschmann et al. is prepared in a single step under a reflux condition in the presence of concentrated inorganic acid and water.

Further, according to DE '377 (Buschmann et al.), the Behrend polymer is prepared by reacting an acetylenediurea (glycoluril) with excess formaldehyde in the presence of a

strong inorganic acid through evaporation of water. Through evaporation of water, the reaction mixture runs through the reaction steps one after another.

As described in the Example and claim 10 of Buschmann et al., the reaction is carried out under the condition in which water is evaporated at 130-150°C (in the Example, the reaction temperature is increased up to 165°C). Thus, as water is evaporated over time, the acidity of a reaction mixture gradually increases.

When cyclization is performed at a high temperature of 110°C or higher with removal of water by evaporation, as in Buschmann et al., only a thermodynamically stable CB[6] can be obtained and other CB derivatives having different polymerization degrees are very scarce. The reason for this is that if the cyclization is performed at a temperature of 110°C or higher, CB[5] and CB[7-20] derivatives are pyrolyzed and recombined into CB[6] derivatives. Also, when water is evaporated, the acidity of the reaction mixture gradually increases, as in Buschmann et al., CB[6] exists in a stable state, as described in *J. Org. Chem.* 2001, *66*, 8094-8100.

On the other hand, in the presently claimed invention, cyclization is performed at 70-105°C. The acidity of the reaction mixture is maintained at a constant level. As a result, CB derivatives having various polymerization degrees (n) can be obtained in a stable manner, without being decomposed into CB[6]. See Declaration, Table, 1 wherein the experimental results of ratios of CB derivatives prepared according to the presently claimed invention and according to Buschmann et al. are compared. According to the preparation method of Buschmann et al., only CB[6] is obtained. On the other hand, according to the preparation method of the presently claimed invention, a CB derivative mixture of CB[5], CB[6], CB[7], CB[8] and CB[9-11] mixed in a predetermined ratio can be obtained.

As described above, the preparation methods of Buschmann et al. are quite different from preparation methods of the present invention. Also, cucurbituril derivatives having different polymerization degrees other than a cucurbituril derivative with n=6 (CB[6]), cannot be obtained by the preparation methods described in Buschmann et al.

Buschmann et al. fails to suggest the presently claimed invention. Moreover, the cucurbituril derivatives obtained by the methods of the presently claimed invention have unexpected or superior properties.

Cucurbituril derivative compositions prepared by the process of the present invention can be directly used to remove organic dyes from waste water, to capture and remove air pollutants such as carbon monoxide, carbon dioxide, NOx and SOx, which is very cost-effective and advantageous for industrial uses. Also, the cucurbituril derivatives and compositions thereof according to the present invention have good utilization efficiency compared to CB[6] of Buschmann et al. This is clearly supported by the experimental results of organic dye removal efficiency of cucurbituril derivatives of the cited references. The experiments were carried out in the same manner as in Example 1 of the present application, and are set forth in the Declaration, Table 2.

Referring to Table 2, the organic dye removal efficiencies of CB[7] and CB[8] according to the presently claimed invention are higher than those of CB[6] of Buschmann et al. The cucurbituril derivative compositions according to the presently claimed invention are advantageous in that they can be directly used in various applications without separate purification.

In view of the foregoing, applicants respectfully submit that DE '377 fails to disclose or suggest the presently claimed invention.

Nickerson does not disclose the process step of the claimed invention. As stated by the Examiner, at column 5, lines 1-20, Nickerson discloses a ratio of 4:1 formaldehyde to acetylene diureine. However, this disclosure relates to a process of preparing methylol compounds disclosed at column 4, lines 69-75, which precedes the passage cited in column 5. At column 4, lines 69-75, Nickerson discloses a reaction carried out in *alkaline* aqueous solution and *not* under the *acidic* condition recited in the present claim 25. Accordingly, Nickerson does not disclose or suggest the presently claimed invention. The Office's statement that Nickerson teaches "a large acid to glycoluril ratio" at column 11, lines 29-42 is erroneous. Applicants respectfully submit that there is no such disclosure at the cited location. There is a disclosure, however, of an aqueous solution having a pH below 3.0 containing 10 to 1 parts by weight of (1) tetramethylol acetylene diureine and other

components. However, this disclosure does not refer to a reaction to form cucurbituril derivatives. Thus, Nickerson fails to suggest the presently claimed invention.

According to the Office, JP '557 teaches heating at a temperature between 50 and 120°C followed by heating to temperatures of up to 130°C at a later reaction stage. Applicants respectfully submit that the Office is in error. The English language machine translation indicates that JP '557 employs a cucurbituril *precursor* which does *not* form a complete cyclic structure. In contrast, the presently claimed invention recites a compound having a cyclic structure. Accordingly, JP '557 fails to disclose or suggest the presently claimed invention.

Cintas also fails to teach the recited process step. The disclosure at page 205 (bottom) to middle of page 206 fails to teach the two-step process and the specific temperatures of heating as presently claimed.

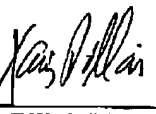
Starkey et al. also fails to teach the process step of the present claims. Mathew has been used for teaching stirring. However, Mathew does not teach or suggest the information that the other references fail to teach or suggest.

Even if the cited references are combined, there being no motivation to combine them, there is no teaching or suggestion to those skilled in the presently claimed invention, particularly, the process step of the invention. There is no reasonable expectation of success in arriving at the claimed invention. Accordingly, the cited references, either alone or in combination, fail to suggest to those of ordinary skill in the art the presently claimed invention. In view of the foregoing, the obviousness rejection is erroneous and should be withdrawn.

Conclusion

Applicants respectfully submit that the patent application is in condition for allowance. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,



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